

What is claimed is:

1. A method for driving an electrophoretic display,  
the display comprising:

5                   a first electrode;  
                  a second electrode; and  
                  a dispersal system containing pigment particles which is provided  
between said first electrode and said second electrode; and  
                  the method comprising:

10                   applying a constant voltage between said first electrode and said  
second electrode during a set time period to cause said particles to migrate to a position  
corresponding to a gradation to be displayed.

2. The method of claim 1,  
wherein when an image displayed is to be switched;  
15                   said constant voltage is applied during a time period corresponding to a  
gradation difference between a gradation displayed before and after switching.

3. The method of claim 1,  
wherein after application of said constant voltage;  
a potential difference between said 1st electrode and said 2nd electrode is  
20                   canceled.

4. The method of claim 1,  
wherein after application of said constant voltage;  
a voltage for braking said pigment particles is applied between said 1st  
and said 2nd electrodes after applying said constant voltage before canceling said  
25                   potential difference between said 1st and said 2nd electrodes .

5. The method of claim 1, further comprising:  
measuring a time after finishing applying said constant voltage between  
said 1st and said 2nd electrodes; and

applying said constant voltage between said 1st and said 2nd electrodes during said time period if said measured time exceeds a predetermined time.

6. A method for driving an electrophoretic display,  
the display comprising:

5 a plurality of data lines;  
a plurality of scanning lines, each of which intersects said data lines;

a common electrode;

10 a plurality of pixel electrodes, with one of said plurality of pixel electrodes being provided at one of each of said intersections of said data lines and said scanning lines, each of said pixel electrodes being provided in opposing spaced relation to said common electrodes;

15 a plurality of dispersal systems comprising a pigment particles, with each of said dispersal systems being provided between said common electrode and one of said pixel electrodes; and

a plurality of switching elements, with one of each of said switching elements being provided at a corresponding one of each of said intersections of said data lines and said scanning lines, with an on/off control terminal being connected to one of said scanning lines passing through one of said intersections; and

20 with one of said data lines passing through one of said intersections, being connected to one of said pixel electrodes provided at one of each of said intersections; and

the method comprising:

25 applying a predetermined common voltage to said common voltage;

selecting said scanning lines sequentially;

applying a voltage to said selected scanning line, to turn on all switching elements connected to the said selected scanning line;

applying a constant voltage to a plurality of said data lines in order to cause said pigment particles in said pixels being provided at said corresponding intersections of the said data lines and the said selected scanning line, to cause said particles to migrate to a position to desired color gradations of an image displayed in the said pixels, during a time period corresponding to said desired color gradations.

7. The method of claim 6,  
wherein when an image displayed to be switched;  
said constant voltage is applied during a time period corresponding to a gradation difference between a gradation displayed before and after switching said image.

8. The method of claim 6,  
wherein after application of said constant voltage to said data lines;  
a brake voltage for braking said pigment particles is applied to the said data lines before applying said common voltage to the said data lines.

9. A method for driving an electrophoretic display,  
the display comprising:  
a plurality of data lines;  
a plurality of scanning lines, each of which intersects said data lines;  
a common electrode;  
a plurality of pixel electrodes, with one of said plurality of pixel electrodes being provided at one of each of said intersections of said data lines and said scanning lines, each of said pixel electrodes being provided in opposing spaced relation to said common electrodes;  
a plurality of dispersal systems comprising a pigment particles,  
with each of said dispersal systems being provided between said common electrode and one of said pixel electrodes; and

a plurality of switching elements, with one of each of said switching elements being provided at a corresponding one of each of said intersections of said data lines and said scanning lines, with on/off control terminal being connected to one of said scanning lines passing through one of said intersections; and

5 with one of said data lines passing through one of said intersections, being connected to one of said pixel electrodes provided at one of each of said intersections; and

the method comprising:

10 applying a predetermined common voltage to said common voltage;

selecting said scanning lines sequentially in a 1st period of a horizontal scanning period;

applying a selection voltage to said selected scanning line, to turn on all switching elements connected to the said selected scanning line;

15 applying a constant voltage to each said selected data line; when a time for migrating said pigment particles in said pixels to a position corresponding to a color gradation to be displayed passes after finishing application of said constant voltage;

20 selecting said scanning line corresponding to the said pixels in a second period of a horizontal scanning period;

applying said selection voltage to the said selected scanning line; and

applying said common voltage only to said data lines corresponding to the said pixels in said second period.

25 10. A method for driving an electrophoretic display, the display comprising:

a plurality of data lines;

a plurality of scanning lines, each of which intersects said data lines;

a common electrode;

a plurality of pixel electrodes, with one of said plurality of pixel electrodes being provided at one of each of said intersections of said data lines and said scanning lines, each of said pixel electrodes being provided in opposing spaced relation to said common electrodes;

a plurality of dispersal systems comprising a pigment particles, with each of said dispersal systems being provided between said common electrode and one of said pixel electrodes; and

a plurality of switching elements, with one of each of said switching elements being provided at a corresponding one of each of said intersections of said data lines and said scanning lines, with on/off control terminal being connected to one of said scanning lines passing through one of said intersections; and

with one of said data lines passing through one of said intersections, being connected to one of said pixel electrodes provided at one of each of said intersections; and

the method comprising:

applying a predetermined common voltage to said common voltage;

selecting said scanning lines sequentially in a 1st period of a horizontal scanning period;

applying a selection voltage to said selected scanning line, to turn on all switching elements connected to the said selected scanning lines;

applying a constant voltage to each the said selected data line;

when a time for migrating said pigment particles in said pixels to a position corresponding to a color gradation to be displayed passes after finishing application of said constant voltage;

selecting said scanning line corresponding to the said pixels in a second period of a horizontal scanning period;

applying said selection voltage to the said selected scanning lines;

and

5                   applying a brake voltage for braking said pigment particles only to said data lines corresponding to the said pixels in said second period;

after said particles are fixed;

selecting the said scanning line corresponding to the said pixels in a 3rd period;

10                   applying said selection voltage to the said selected scanning lines;

and

applying said common voltage to the said selected data lines in said 3rd period.

11.     The method of claim 9,

15                   wherein when an image displayed to be switched;

said period of applying said constant voltage, which starts from finishing applying of said constant voltage and ends with selecting the said scanning line corresponds to a gradation difference between a gradation displayed before and after switching.

20           12.     A drive circuit for an electrophoretic display,

the display comprising:

a plurality of data lines;

a plurality of scanning lines, each of which intersects said data lines;

25                   a common electrode;

a plurality of pixel electrodes, with one of said plurality of pixel electrodes being provided at one of each of said intersections of said data lines and said

scanning lines, each of said pixel electrodes being provided in opposing spaced relation to said common electrodes;

a plurality of dispersal systems comprising a pigment particles,  
with each of said dispersal systems being provided between said common electrode and  
5 one of said pixel electrodes; and

a plurality of switching elements, with one of each of said  
switching elements being provided at a corresponding one of each of said intersections  
of said data lines and said scanning lines, with an on/off control terminal being  
connected to one of said scanning lines passing through one of said intersections; and

10 with one of said data lines passing through one of said  
intersections, being connected to one of said pixel electrodes provided at one of each of  
said intersections; and

the circuit comprising:

an applying unit, which applies a predetermined common voltage  
15 to said common electrode;

a scanning line drive unit, which selects said scanning lines  
sequentially and applies a selection voltage to said selected scanning line, to turn on all  
switching elements connected to the said selected scanning line; and

a data line drive unit, which in a certain period of a selected  
20 scanning line, after applying a constant voltage during a time period to cause said  
pigment particles of each pixel to migrate to a position corresponding to the said  
selected scanning line to a position according to a color gradation of an image of each  
of said pixel, applies said common voltage to each of said pixel.

13. The drive circuit of claim 12, wherein said data line drive unit  
25 comprising:

after applying said constant voltage to each of the said data line;

applying a brake voltage to each the said data line before applying said  
common voltage to each the said data line.

14. A drive circuit for an electrophoretic display,  
the display comprising:

a plurality of data lines;

a plurality of scanning lines, each of which intersects said data

5 lines;

a common electrode;

a plurality of pixel electrodes, with one of said plurality of pixel  
electrodes being provided at one of each of said intersections of said data lines and said  
scanning lines, each of said pixel electrodes being provided in opposing spaced relation  
10 to said common electrodes;

a plurality of dispersal systems comprising a pigment particles,  
with each of said dispersal systems being provided between said common electrode and  
one of said pixel electrodes; and

a plurality of switching elements, with one of each of said  
15 switching elements being provided at a corresponding one of each of said intersections  
of said data lines and said scanning lines, with an on/off control terminal being  
connected to one of said scanning lines passing through one of said intersections; and  
with one of said data lines passing through one of said  
intersections, being connected to one of said pixel electrodes provided at one of each of  
20 said intersections; and

the circuit comprising:

an applying unit, which applies a predetermined common voltage  
to said common electrode;

a scanning line drive unit, which selects said scanning lines  
25 sequentially and applies a selection voltage to said selected scanning line, to turn on all  
switching elements connected to said selected scanning line in a 1st period of each  
horizontal scanning period;



when a time for migrating said pigment particles in said pixels to a position corresponding to a color gradation to be displayed passes after finishing application of said constant voltage;

5 selects said scanning line corresponding to the said pixels in a second period of a horizontal scanning period; and

applies said selection voltage to the said selected scanning line; and

a data line drive unit, which applies a constant voltage to all said data lines in said 1st period of each of said horizontal scanning period and applies said  
10 common voltage only to the said data lines corresponding to the said pixels in said 2nd period.

15. A drive circuit for an electrophoretic display,  
the display comprising:

a plurality of data lines;  
15 a plurality of scanning lines, each of which intersects said data lines;

a common electrode;

a plurality of pixel electrodes, with one of said plurality of pixel electrodes being provided at one of each of said intersections of said data lines and said  
20 scanning lines, each of said pixel electrodes being provided in opposing spaced relation to said common electrodes;

a plurality of dispersal systems comprising a pigment particles, with each of said dispersal systems being provided between said common electrode and one of said pixel electrodes; and

25 a plurality of switching elements, with one of each of said switching elements being provided at a corresponding one of each of said intersections of said data lines and said scanning lines, with on/off control terminal being connected to one of said scanning lines passing through one of said intersections; and

with one of said data lines passing through one of said intersections, being connected to one of said pixel electrodes provided at one of each of said intersections; and

the circuit comprising:

5 an applying unit, which applies a predetermined common voltage to said common electrode;

a scanning line drive unit, which selects said scanning lines sequentially

10 in a 1st period of a horizontal scanning period having said 1st, a 2nd, and 3rd period;

when a time for migrating said pigment particles in said pixel at an intersection of said scanning line and said data line to positions corresponding to a color gradation to be displayed passes after selection of the said scanning line;

selects said selected scanning line in said 2nd period; and

15 when a predetermined time passes, selects said selected scanning line in said 3rd period; and

a data line drive unit, which applies a constant voltage to all said data lines in said 1st period in which the said scanning line is selected;

20 applies a brake voltage for braking the said pigment particles in said 2nd period in which the said scanning line is selected to the said data lines; and

applies said common voltage to the said data lines in said 3rd period in which the said scanning line is selected.

16. The circuit of claim 14,

wherein when an image displayed to be switched;

25 said constant voltage is applied during a time period corresponding to a gradation difference between a gradation displayed before and after switching said image.

17. An electronic device, comprising:

an electrophoretic display panel, comprising:

a plurality of data lines;

5 a plurality of scanning lines, each of which intersects said data lines;

a common electrode;

a plurality of pixel electrodes, with one of said plurality of pixel electrodes being provided at one of each of said intersections of said data lines and said scanning lines, each of said pixel electrodes being provided in opposing spaced relation  
10 to said common electrodes;

a plurality of dispersal systems comprising pigment particles, with each of said dispersal systems being provided between said common electrode and one of said pixel electrodes; and

a plurality of switching elements, with one of each of said switching elements being provided at a corresponding one of each of said intersections of said data lines and said scanning lines, with on/off control terminal being connected to one of said scanning lines passing through one of said intersections; and

with one of said data lines passing through one of said intersections, being connected to one of said pixel electrodes provided at one of each of  
20 said intersections;

an applying unit, which applies a predetermined common voltage to said common electrode;

a scanning line drive unit, which selects said scanning lines sequentially and applies a selection voltage to said selected scanning lines, to turn on all  
25 switching elements connected to said selected scanning lines; and

a data line drive unit, which in a certain period of a selected scanning line, after applying a constant voltage during a time period to cause said pigment particles of each pixel to migrate to a position corresponding to the said

selected scanning line to a position according to a color gradation of an image of each of said pixel, applies said common voltage to each of said pixel.